

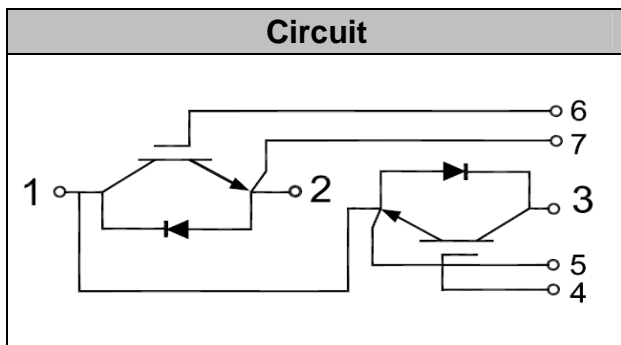
## IGBT Modules



**V<sub>CES</sub>**            1200V  
**I<sub>C</sub>**                 150A

### Applications

- Industrial Inverters
- Servo Applications
- SMPS UPS
- Induction Heating



### Features

- Short Circuit Rated 10 $\mu$ s
- Low Stray Inductance
- Low Saturation Voltage
- Ultra Low loss
- HI-REL Power Terminals
- Lead Free, Compliant With RoHS Requirement

### Absolute Maximum Ratings (T<sub>C</sub> = 25 °C unless otherwise specified)

Symbol	Description	Values	Units
V <sub>CES</sub>	Collector - Emitter Voltage	1200	V
V <sub>GES</sub>	Gate-Emitter Voltage	±20	V
I <sub>C</sub>	DC Collector Current	T <sub>C</sub> =25°C	210 A
		T <sub>C</sub> =80°C	150 A
I <sub>Cpuls</sub>	Pulsed Collector Current	T <sub>C</sub> =25°C, t <sub>p</sub> =1ms	420 A
		T <sub>C</sub> =80°C, t <sub>p</sub> =1ms	300 A
P <sub>tot</sub>	P <sub>tot</sub> Power Dissipation Per IGBT	880	W
T <sub>J</sub>	Junction Temperature Range	40 to +150	°C
T <sub>STG</sub>	Storage Temperature Range	40 to +125	°C
Viso	Insulation Test Voltage	AC, t=1min	3000 V
Mounting Torque	Power Terminals Screw: M6	5±15%	N*m
	Mounting Screw:M6	5±15%	N*m

Notes :

(1) Repetitive Rating: Pulse width limited by max. junction temperature



## Electrical Characteristics of IGBT (T<sub>J</sub> = 25 unless otherwise specified)

Symbol	Item	Conditions	Values			Units
			Min.	Typ.	Max.	
<b>OFF Characteristics</b>						
V <sub>(BR)CES</sub>	Collector-Emitter Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 1mA	1200			V
I <sub>CES</sub>	Collector Leakage Current	V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V, T <sub>J</sub> =25°C			0.5	mA
		V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V, T <sub>J</sub> =125°C			2	mA
I <sub>GES</sub>	Gate Leakage Current	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V	-200		200	nA
<b>ON Characteristics</b>						
V <sub>GE(th)</sub>	Gate - Emitter Threshold Voltage	V <sub>CE</sub> =V <sub>GE</sub> , I <sub>C</sub> =6mA	5	6.1	7	V
V <sub>CE(sat)</sub>	Collector – Emitter Saturation Voltage	I <sub>C</sub> =150A, V <sub>GE</sub> =15V, T <sub>J</sub> =25°C		2.0	2.3	V
		I <sub>C</sub> =150A V <sub>GE</sub> =15V, T <sub>J</sub> =125°C		2.3	2.6	V
<b>Dynamic Characteristics</b>						
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f = 1MHz		8.8		nF
C <sub>res</sub>	Reverse Transfer Capacitance			0.48		nF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>CC</sub> =600V, I <sub>C</sub> =150A R <sub>G</sub> = 15 Ω, V <sub>GE</sub> = ± 15V T <sub>J</sub> =25°C Inductive Load		150		ns
t <sub>r</sub>	Rise Time			70		ns
t <sub>d(off)</sub>	Turn-off Delay Time			420		ns
T <sub>f</sub>	Fall Time			50		ns
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>CC</sub> =600V, I <sub>C</sub> =150A R <sub>G</sub> = 15 Ω, V <sub>GE</sub> = ± 15V T <sub>J</sub> =125°C Inductive Load		170		ns
t <sub>r</sub>	Rise Time			80		ns
t <sub>d(off)</sub>	Turn-off Delay Time			470		ns
T <sub>f</sub>	Fall Time			60		ns
E <sub>on</sub>	Turn-on Switching Loss	V <sub>CC</sub> =600V, R <sub>G</sub> = 15 I <sub>C</sub> =150A	T <sub>J</sub> =25°C		22	mJ
			T <sub>J</sub> =125°C		24	mJ
E <sub>off</sub>	Turn-off Switching Loss	V <sub>CC</sub> =600V, R <sub>G</sub> = 15 I <sub>C</sub> =150A	T <sub>J</sub> =25°C		9	mJ
			T <sub>J</sub> =125°C		9.6	mJ
Q <sub>ge</sub>	Gate Charge	V <sub>CC</sub> =600V, I <sub>C</sub> =150A, V <sub>GE</sub> = ± 15V		700		nC
RBSOA	Reverse Bias Safe Operating Area	I <sub>C</sub> = 200A, V <sub>CC</sub> = 600V, V <sub>p</sub> = 1200V, R <sub>g</sub> = 10Ω, V <sub>GE</sub> =+15V to 0V, T <sub>J</sub> =150°C	Trapezoid			
SCSOA	Short Circuit Safe Operating Area	V <sub>CC</sub> = 600V, V <sub>GE</sub> = 15V, T <sub>J</sub> = 150°C	10			μs



## Electrical Characteristics of FWD ( $T_C = 25$ unless otherwise specified)

Symbol	Item	Conditions	Min.	Typ.	Max.	Units	
$V_{FM}$	Forward Voltage	$I_F = 150A,$ $V_{GE} = 0V$	$T_J = 25^\circ C$		2.0	2.48	V
			$T_J = 125^\circ C$		1.7	2.20	
$t_{rr}$	Reverse Recovery Time	$I_F=150A, V_R=600V,$ $di_F/dt=-3000A/\mu s,$ $T_V=125^\circ C,$		350		ns	
$I_{RRM}$	Max. Reverse Recovery			160		A	
$E_{rec}$	Reverse Recovery Energy			11.5		mJ	

## Thermal Resistance Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)			0.17	$^\circ C/W$
$R_{\theta JC}$	Junction-To-Case (Diode Part, Per Leg)			0.3	$^\circ C/W$
Mt	Power Terminals Screw:M6	3		5	N·m
Ms	Mounting Screw:M6	3		5	N·m
Weight	Weight Of Module			300	g

## Performance Curves

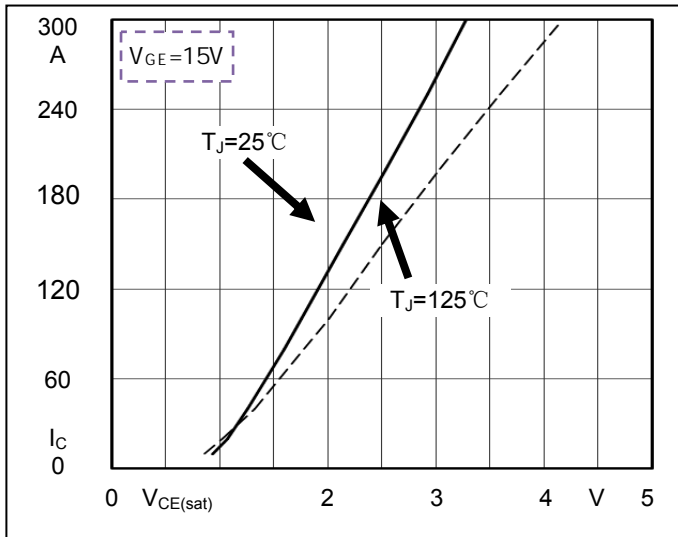


Fig1. Typical Output Characteristics

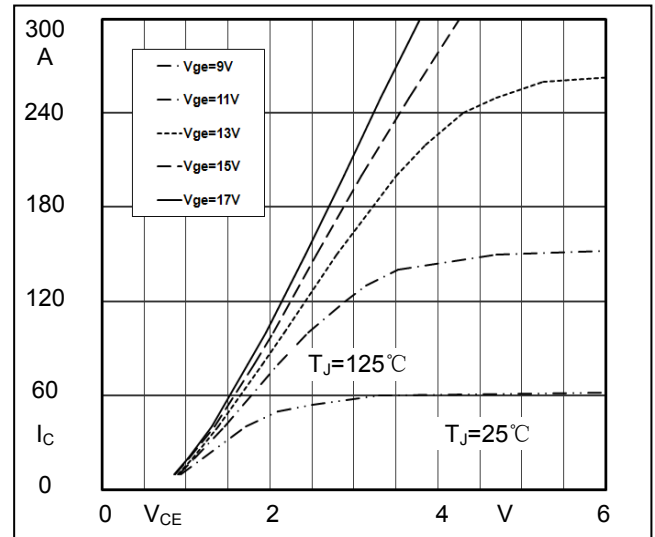


Fig2. Typical Output Characteristics

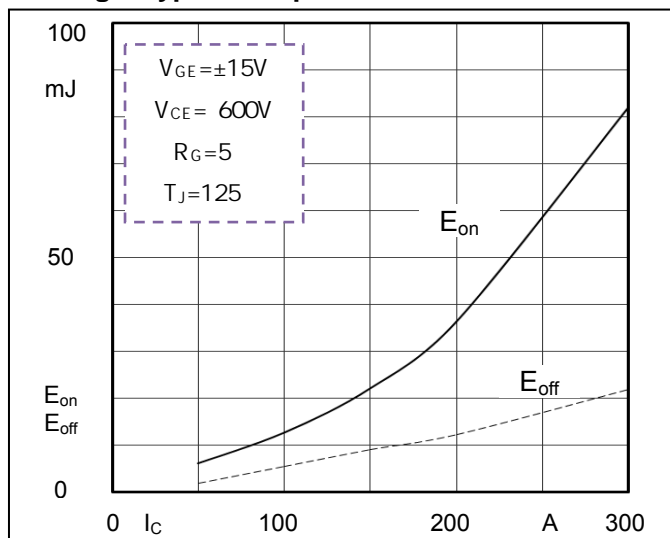


Fig3. Switching Energy vs. Collector Current

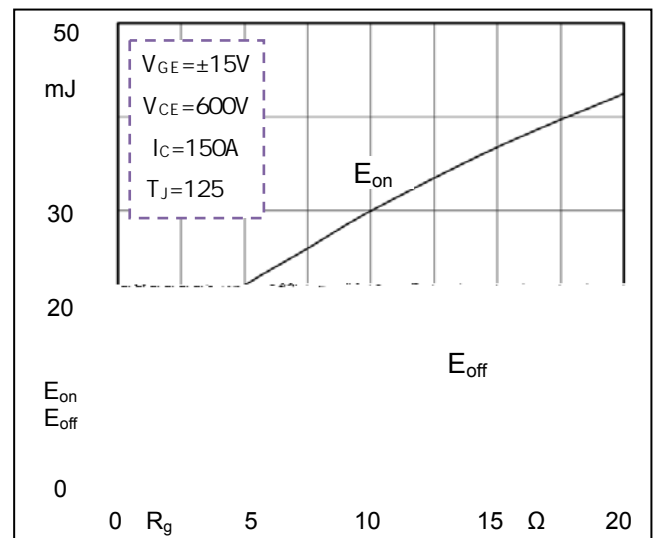


Fig4. Switching Energy vs. Gate Resistor

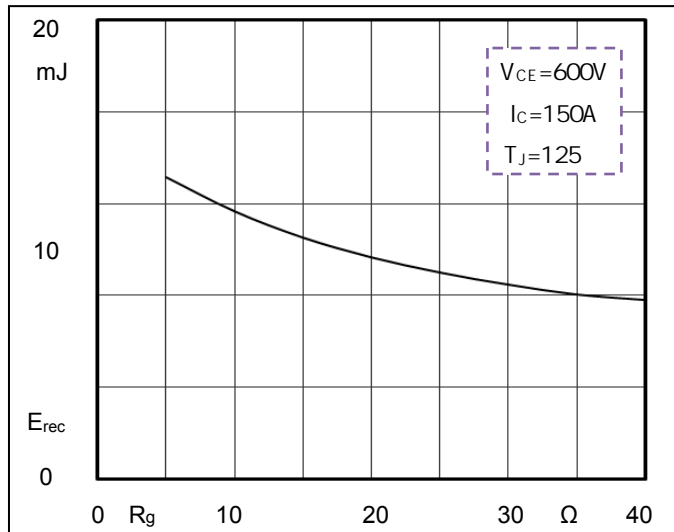


Fig5. Switching Energy vs. Gate Resistor

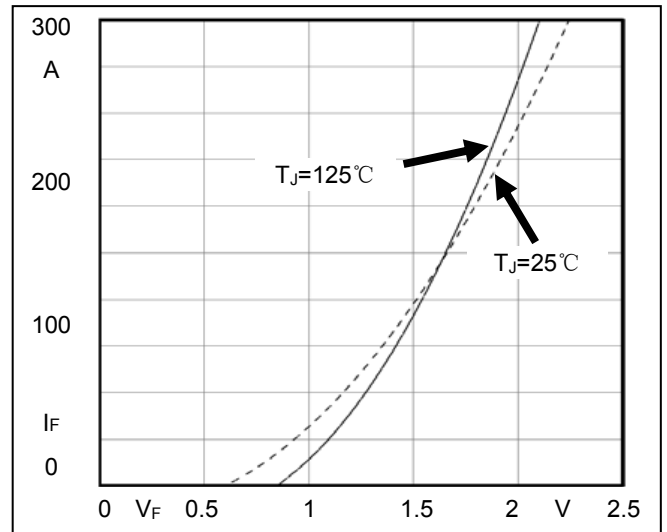


Fig6. Diode Forward Characteristics

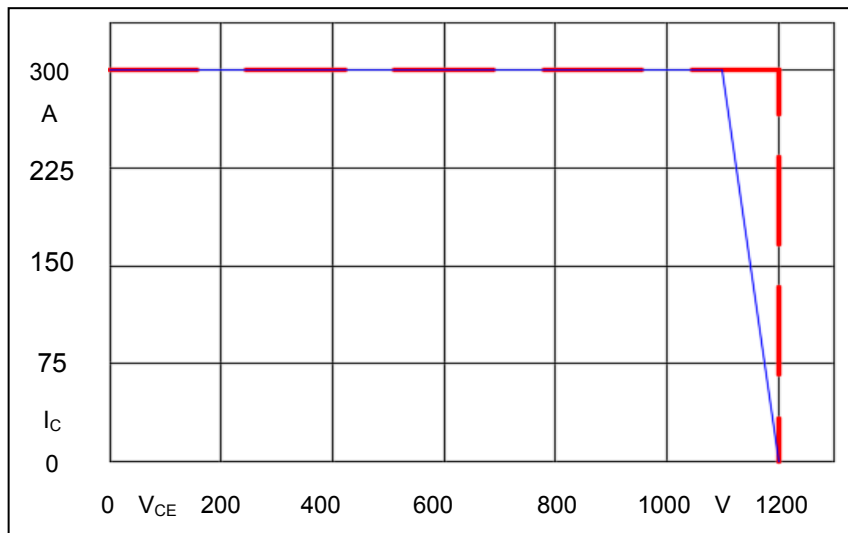


Fig7. Reverse Bias Safe Operation Area (RBSOA)

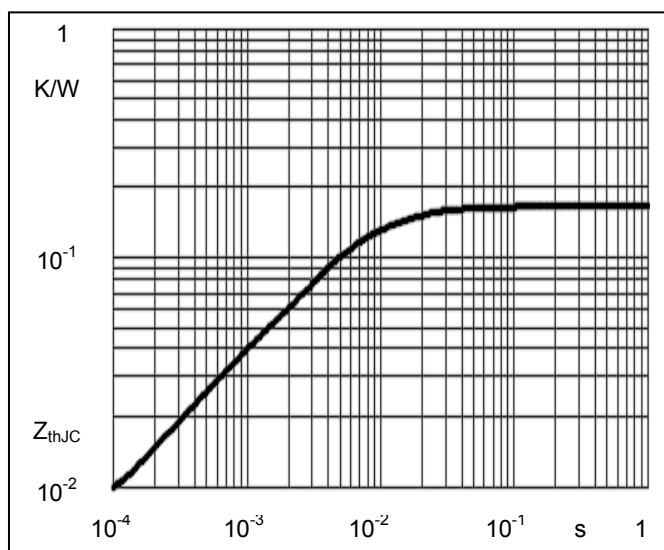


Fig8. Transient Thermal Impedance of IGBT

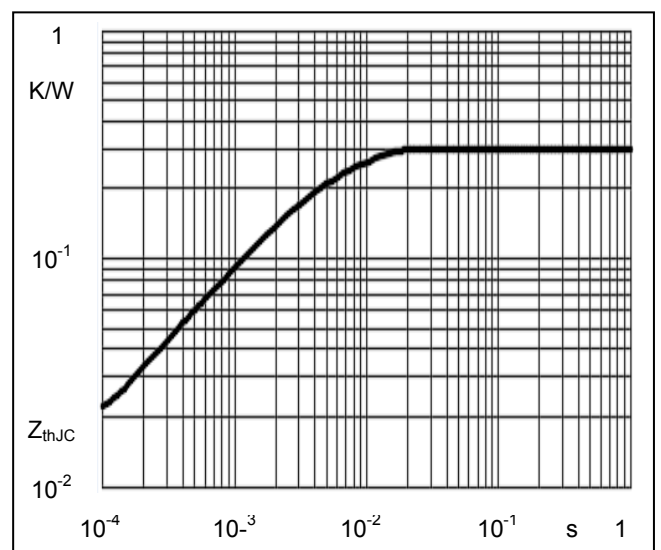
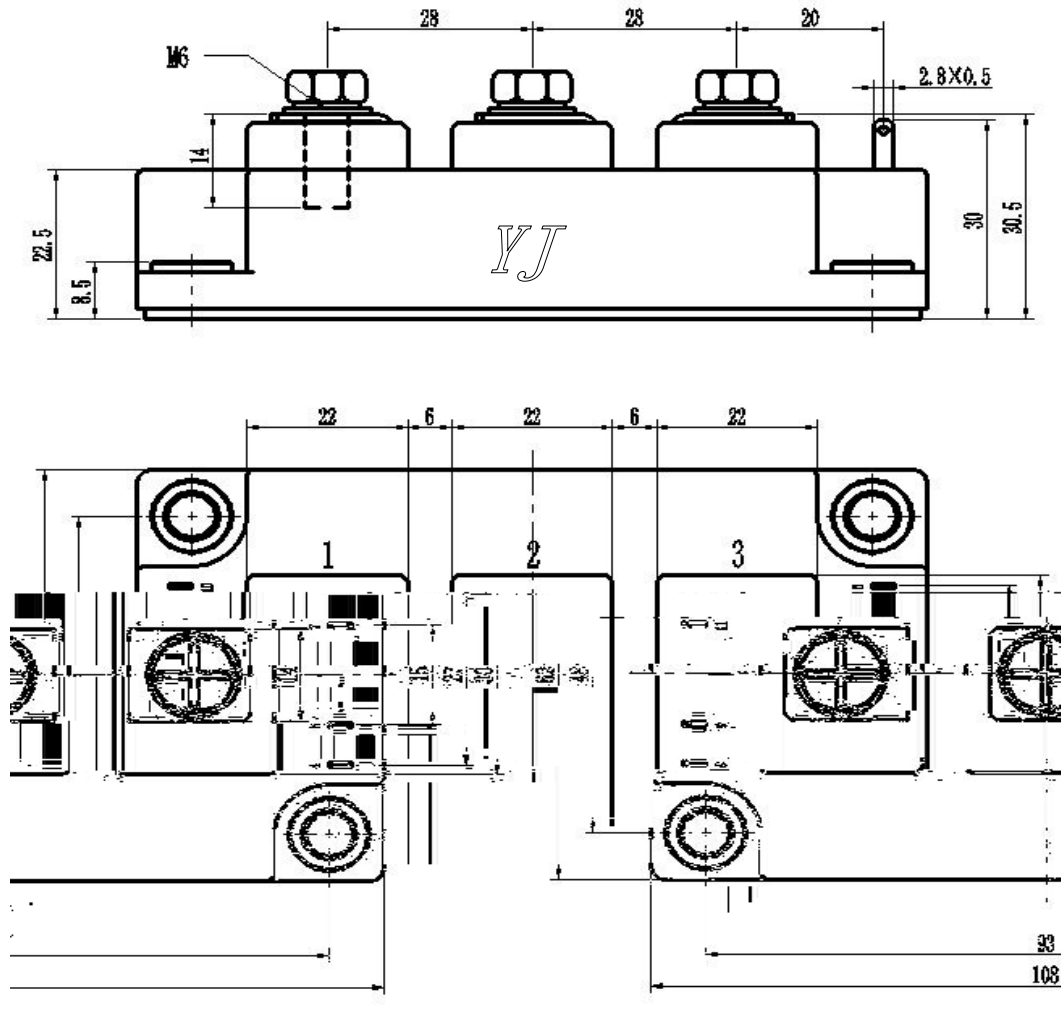


Fig9. Transient Thermal Impedance of Diode



## Package Outline Information

CASE: C2



Dimensions in mm